Center Independent Research & Development: KSC IRAD

Simple Radiowave-Based Method for Measuring Peripheral Blood Flow (RFII)

Completed Technology Project (2013 - 2014)

Project Introduction

Project objective is to design small radio frequency based flow probes for the measurement of blood flow velocity in peripheral arteries such as the femoral artery and middle cerebral artery. The result will be the technological capability to measure peripheral blood flow rates and flow changes during various environmental stressors such as microgravity without contact to the individual being monitored. This technology may also lead to an easier method of detecting venous gas emboli during extravehicular activities.

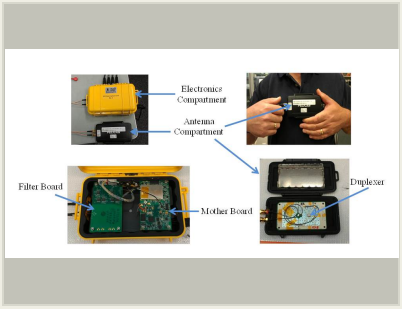
This technology will be a quantum advance in hemodynamic monitoring and will be applicable in numerous situations such as for immediate assessment and monitoring of patients in life-threatening emergencies, during environmental stressors, and in performance of hazardous occupational tasks. For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies.

Anticipated Benefits

Project benefits to NASA can be used aboard the International Space Station (ISS) with noncontact monitoring of heart rate, cardiac output, and respiration during both exercise and extravehicular activity (EVA) performed by astronauts outside the spacecraft. At Kennedy Space Center (KSC), monitoring is needed in stressful tasks, such as firefighting and Self-Contained Atmospheric Protection Ensemble (SCAPE). This technology can also provide benefits for clinical emergency medicine for immediate assessment of shock to NASA, Department of Defense (DoD), National Institutes of Health (NIH), and many health care industry applications.

NASA's tangible benefits will include easier and safer monitoring of peripheral blood flows during spaceflight, space-related operations and increased reliability due to easier operation. For the Department of Defense this technology can benefit health monitoring of troops in combat.

This technology could also benefit cardiopulmonary bypass patients and any situation where simple non-contact hemodynamic monitoring is required. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times.



RFII Hardware

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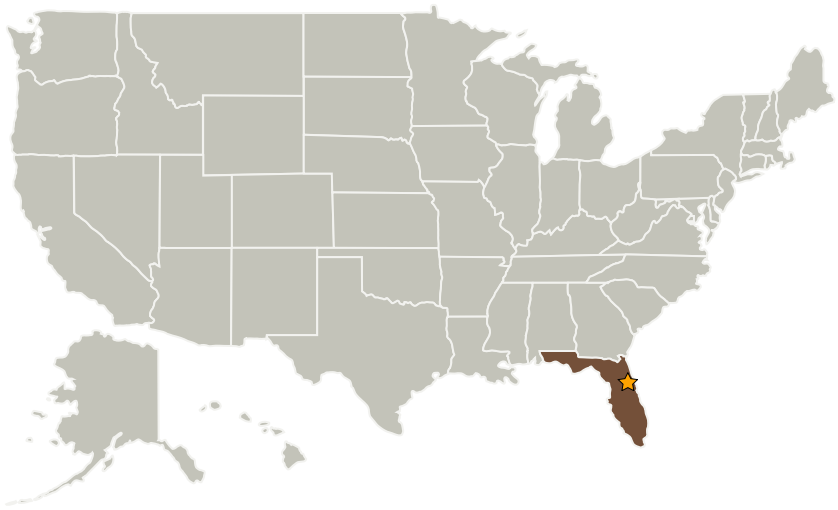
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Department of Defense(DoD)	Supporting Organization	US Government	Washington, District of Columbia

Primary U.S. Work Locations
Florida

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Independent Research & Development: KSC IRAD

Project Management

Program Manager:

Barbara L Brown

Project Manager:

David A Tipton

Principal Investigator:

David R Bush

Co-Investigators:

Barry C Slack
Robert G Cummings

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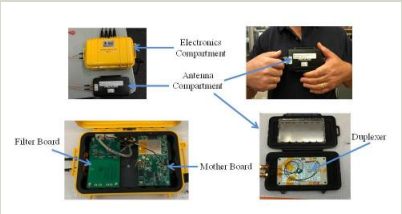
Images



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(https://techport.nasa.gov/image/3035)

Stories

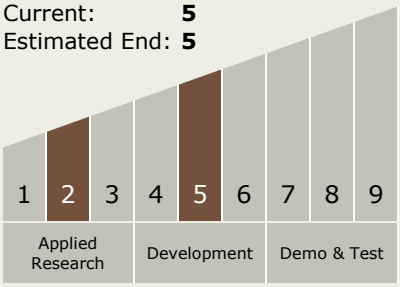
NASA Chief Technologist Visits NASA's Space Life Sciences Lab
(https://techport.nasa.gov/file/1660)

Links

KSC Spaceport News article "New diagnostic tools may benefit patients in space." Vol. 53, No. 6, page 11, Mar 22, 2013
(http://www.nasa.gov/centers/kennedy/pdf/736478main_mar22-2013.pdf)

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.4 Contact-less / Wearable Human Health and Performance Monitoring